Teleradiology over the Internet

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The WEBRAD project is a testbed to demonstrate the use of standard Internet tools and techniques applied to teleradiology. This is a joint project between the Radiology Department, Imaging Science and Information Systems (ISIS) Center at Georgetown University Medical Center (GUMC) in Washington D.C. and the Analogic Corporation, Peabody, Massachusetts. The objective of this project is to develop a user-friendly radiologist-oriented interface using familiar navigation and viewing tools of the World Wide Web.

This project utilizes standard TCP/IP client server tools for the World Wide Web (WWW) and:

- Web based hypertext pages for navigation
- Web based image viewing tools
- Web based form interaction to conduct routine clinical teleradiology diagnosis.

When WEBRAD is fully developed, we will achieve two major goals: (1) To make use of the existing information superhighway infrastructure to deliver health care to remote locations efficiently and inexpensively, and (2) To improve the overall health care system by providing diagnosis support for a patient by remote specialists utilizing Internet connections.

At GUMC, film based images are fed into the Lumiscan 150 film digitizer. The user then selects the correct image size and image resolution and enters the patient's medical information. Then the digitizer produces Lumisys formatted files which contain both the patient's medical information and the images. These image files along with the image files from other imaging modalities will be transferred to the host computer running all the server software including RGS, WEBRAD, and Web server. The RGS detects the new files and recognizes the format of the files received. The RGS then converts them into FFP file format. WEBRAD recognizes FFP files and stores them into the database. Once the database has been updated, WEBRAD assembles new radiologist's and patient's pages in HTML format so that the WEBRAD client will always access the most up-to-date information.

On the client side, a radiologist connects to an available WEBRAD server and logs in as a registered user. Once the radiologist enters a correct password WEBRAD will display the radiologist's page containing a list of available patients. The radiologist can specify how the list of patients is displayed according to name, ID, birthdate, etc. The radiologist will then select a patient of interest and WEBRAD will display the specific patient's page with all the medical information and images. On the patient's page, the radiologist can choose an image by clicking on it. The image will be transferred to the client computer using FTP and will launch the radiologist-specific image viewer. This process can be performed continuously with multiple images or different patients.

We realize that there are some bottlenecks and limitations in the performance of the existing Internet, but we believe that Internet speeds will increase in the future. Therefore, in order to compensate for the current limitations subsequent steps will include:

- Increasing network bandwidth by using high speed connections such as ISDN, T1, ATM, etc.
- Increasing information transfer rate by implementing compression algorithms at the server side and decompression algorithms at the client side
- Incorporating security information transactions between client and server using data encryption technology
- Developing a more complete radiology specific image viewer on multiple computer platforms.

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